

LISTING OF CLAIMS

1.-11. (canceled)

12. (previously presented) A method of manufacturing a copper metal interconnection layer comprising the steps of:

- (a) forming a barrier layer along a stepped portion over the surface of an interdielectric layer having a recessed region;
- (b) forming a copper seed layer on the barrier layer; and
- (c) exposing the barrier layer by chemical mechanical polishing (CMP) using a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent, and deionized water so that the copper seed layer remains only within the recessed region.

13. (previously presented) The method of claim 12, after the step (c), further comprising the steps of:

forming a copper layer on the copper seed layer formed in the recessed region; and
planarizing the copper layer, the copper seed layer and the barrier layer to form a copper metal interconnection layer,

wherein the copper layer, the copper seed layer, and the barrier layer are projected in order above the surface of the interdielectric layer, respectively.

14. (original) The method of claim 12, wherein the recessed region includes a trench region in the shape of a line recessed from the surface of the interdielectric layer.

15. (original) The method of claim 12, wherein the recessed region includes a combination of a trench region in the shape of a line recessed from the surface of the interdielectric layer, and contact holes or via holes penetrating the interdielectric layer.

16. (original) The method of claim 12, wherein the barrier layer is formed using a material which can prevent diffusion of metal and act as an adhesive layer between the interdielectric layer and the metal interconnections.

17. (original) The method of claim 12, wherein in the step (b), the copper seed layer is formed by a physical vapor deposition method.

18. (original) The method of claim 12, wherein the oxidizing agent is hydrogen peroxide, an oxidizing agent of a ferric series or an oxidizing agent of an ammonium series.

19. (original) The method of claim 18, wherein the concentration of hydrogen peroxide is within the range of about 1% to about 20% by weight.

20. (original) The method of claim 18, wherein the concentration of the oxidizing agent of the ferric series is within the range of about 0.01% to about 5 % by weight.

21. (original) The method of claim 18, wherein the concentration of the oxidizing agent of the ammonium series is within the range of about 0.01% to about 5 % by weight.

22. (original) The method of claim 12, wherein a pH of the solution is within the range of about 2 to about 11.

23. (original) The method of claim 12, wherein the pH controlling agent is an acidic or basic solution.

24. (original) The method of claim 23, wherein the acidic solution is a sulfuric acid, a nitric acid, a hydrochloric acid or a phosphoric acid solution, and the basic solution is a potassium hydroxide or an ammonium hydroxide solution.

25. (original) The method of claim 12, wherein the chelate reagent is diammonium sodium salt (DASS), citric acid, malic acid, gluconic acid, gallic acid, tannic acid, ethylenediaminetetraacetic (EDTA) or benzotriazole (BTA).

26. (original) The method of claim 12, wherein the concentration of the chelate reagent is within the range of about 0.001% to about 1% by weight.

27. (canceled)

28. (previously presented) A method of manufacturing a copper metal interconnection layer comprising the steps of:

- (a) forming a barrier layer along a stepped portion over the surface of an interdielectric layer having a recessed region;
- (b) forming a copper seed layer on the barrier layer by physical vapor deposition; and
- (c) exposing the barrier layer by chemical mechanical polishing (CMP) using a solution comprising an oxidizing agent, a pH controlling agent, a chelate reagent, and deionized water so that the copper seed layer remains only within the recessed region, wherein the step of exposing the barrier layer by CMP does not include the use of an abrasive.